HUMPBACK WHALES *MEGAPTERA NOVAEANGLIAE* IN THE GORGONA ISLAND, COLOMBIAN PACIFIC BREEDING WATERS: POPULATION AND POD CHARACTERISTICS

L. FLÓREZ-GONZÁLEZ

Flórez-González, L. 1991 07 01: Humpback Whales *Megaptera novaeangliae* in the Gorgona Island, Colombian Pacific breeding waters: population and pod characteristics. *Memoirs of the Queensland Museum* 30(2):291–295. Brisbane. ISSN 0079-8835.

Photo-identification was used to study the Humpback Whale population which arrived at the Parque Nacional Natural Isla Gorgona between 1986 and 1988. Fifty animals were identified in 1986, 40 in 1987 and 35 in 1988 for a total of 108. Eleven individuals were common to 1986/1987 and 6 to 1987/1988. Three individuals were common for the three years. Using Petersen's formula, the estimates of the population for the 3 years ranged from 170 to 450. Gorgona has suitable environmental conditions required for humpback reproduction. The importance of Gorgona as a calving area is shown by the fact that 26.5% of animals seen were calves. The groups that stayed the longest time in the area were females accompanied by their calves but in general the frequencies were low. Humpbacks visit the region from June to November, the breeding season for Southern Hemisphere populations. During the years of study, behaviour of individuals and groups was analysed.

L. Flórez-González, Universidud Nacional de Colombia - Fundación Yubarta A.A. 33141 Cali (Valle), Colombia; 10 January, 1991.

This is the first biological contribution on humpbaeks in Colombia. Due to its geographic position, Colombia may potentially be a meeting place for Northern and Southern Hemisphere populations; therefore, this study may help to identify part of the migratory routes of both populations and may contribute to the protection and management of the species.

Photo-identification (Katona et al.,1979) permits identification of individuals based on pigmentation patterns, natural markings and scars; it has been used by various authors in different areas, and represents a useful tool for the estimation of populations, distribution, migration patterns and social dynamics (Herman et al., 1979; Whitehead, 1981; Whitehead, 1983; Balcomb and Nichols, 1982; Darling and MacSweeney, 1985; Mayo et al., 1985; Baker et al., 1987; Clapham and Mayo, 1987; Kaufman et al., 1987; Chu and Nieukirk, 1988).

Humpbaek whale research in the Southern Hemisphere in America is limited. There are some studies that discuss the presence of this species (Alberica, 1986)as well as the lack of conservation and management polieies (Aguayo-Lobo and Torres,1967; Paiva and Grangeiro, 1970; Pinedo and Castelo, 1980; Càrdenas et al., 1986; Guerra-Correa et al., 1987).Only one study similar to that reported herein has previously been earried out in South America; that study, in 1988, at Abrolhos Bank, an important breeding site off northeastern Brazil employed photo-identification and identified 64 individuals (Siciliano et al., 1990).

In Area 1 (feeding site) of the Antaretic, Stone and Hamner (1988) identified 32 individuals in 1985–1986. With the aid of a photographic catalogue, a Humpback Whale has been identified at both the Antarctic Peninsula and Gorgona Island areas. This is the first time that a Humpback Whale has been shown to cross the equator, and the first time an Antaretie Humpback Whale has been documented in South Ameriean waters (Stone, Flórez-González and Katona, 1990).

STUDY AREA

The research was carried out in the Parque Nacional Natural Isla Gorgona, an area of approximately 49200 hectares, including Gorgona and Gorgonilla Islands (Fig.1) and established in June 1985. It is on the Pacific continental shelf of Colombia (2°47'–3°06'N and 78°06'–78°18'W), 56 km from Guapi the nearest mainland town. Gorgona is approximately 10x3 km; its maximum height is 330m. The study area is located within the Intertropical Convergence Zone and thus endures variable winds and high pluviosity (7000–8000 mm annually). Salinity

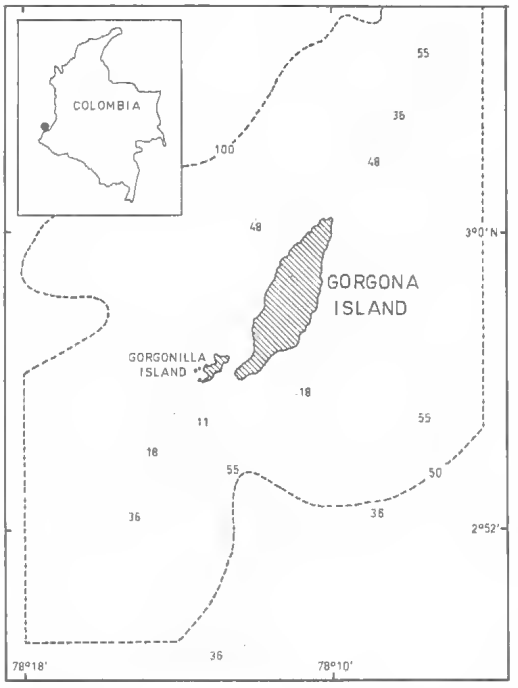

FIG. 1. Location map of study area. The broken line designates the Parque Nacional Natural Isla Gorgona limits. The dotted lines indicate isobaths in metres. The dot on the inset map indicates Gorgona Island in the Colombian Pacific.

around Gorgona is 31–33 parts per thousand. Water temperature is 26–28°C (INDERENA, 1986; Llinás et al.,1990).

METHODS

Monitoring was carried out daily between 10 am and 6 pm. The surveys were conducted from a fibreglass taxi boat with a 25 horsepower outboard motor. On some occasions, the animals were followed 15–20 km from the island, but normally no more than 5 km. When conditions prevented use of a boat observations were made from the high bay coast guard tower.

Song recordings were made with a Sony, TC-D5M, Tape recorder and a hydrophone with a frequency response 50–10000 Hz. Analysis of the song recordings have not been included in the present paper, however this field information permitted location and identification of individual singers.

RESULTS AND DISCUSSION

Three years of observations in the area permitted the photo-identification of 108 individuals. Fifty animals were identified in 1986, 40 in 1987 and 35 in 1988; 17 individuals were sighted in more than one year: 11 were common to 1986-1987 and 6 were common to 1987-1988, 3 individuals were common for the three years . The 17 common individuals were: 3 females, 2 males, 1 calf, 4 adults, 1 immature and 6 non discriminated. Using Petersen's formula (Begon, 1979), the population for the three years was estimated at 170–450.

Of the 108 individuals, 42 (39%) were identified by their back and the ventral surface of the flukes, 44 (41%) were identified exclusively by the ventral surface of the flukes and 22 (20%) using only the back. In 30 individuals, other characters (pectorals, dorsal region of the flukes, ventral region of the body and the head) were employed in identification.

Five (5) fluke and six (6) back photographs show a thin layer of diatom growth. Five (5) underside tail region photographs show killer whale teeth scars.

As previously established, Humpback Whales, during breeding activities, prefer meeting in groups near continents and around islands, in shallow waters, with protected beaches and temperatures 24–28°C. The eastern and extreme southern regions of Gorgona present these factors and this makes the island an ideal breeding site. Here 26.5% of observed animals were calves.

Individual Activities

Apparently, irrespective of age or sex, whales were observed in the following activities: spinning breach, full breach, chin breach, tail breach, lobtail, flippering, rolling, spyhop, and drifting. These activities have been described in humpback populations in different regions (Whitehead, 1981,1985a,b; Mayo et al., 1985; Pittman and Danton, 1985; Kaufman and Forestell, 1986; Silber,1986).

Group Characterisation

The Humpback Whale population in Gorgona Island was observed in 5 classes of groupings: 1, solitary animal; 2, female and her calf; 3, two animals without calf; 4, three individuals usually a female with her calf and an escort; 5, group of more than three individuals.

Of 35 solitary animals the 14 found in 1986 included 7 male singers; the 17 seen in 1987 included 13 male singers, in 1988 4 were seen

but it was impossible to determine if they were male singers. Of the 35 solitary individuals, 7 were heard from the boat without any electronic aid. The solitary animals generally presented an elusive behaviour making immersions of 15–20 minutes, and showing little activity on the surface.

Groups including a female and calf were frequently found near the island, especially on the east, or protected side. For all observed females, epimeletic behaviour was evident. Three females and their calves were found on two occasions in a period of 8 days. One female and her calf were observed in two consecutive years (1987–1988). In the three years, 13 groups of two individuals, none calves, were observed. Most were adults but it was not possible to determine the sex; they showed little activity on the surface. Mobley and Herman (1985) found that the most stable social unit for groups without a calf was that of adult pairs. However, as in this study, it was not possible to determine the sex of the pairs. Tyack and Whitehead (1983), suggested that the pairs are formed by an adult female and an adult male. Six trios had a female, her calf and an escort. Only two escorts were certainly males; for the remaining it was impossible to determine sex. Two triples were observed twice in the same year in the space of 2 and 8 days, respectively. Similar results have been described by Baker and Herman (1984a) who cited observation of a trio on two consecutive days. However, this does not necessarily imply that the trio stayed together during these days. All groups with escorts were travelling, and courtship behaviour was never seen. On all ocassions the small animal was swimming on top or beneath the female and the escort was generally protecting the group, locating itself between the ship and the couple, and sometimes using distractive tactics.

Herman and Antinoja (1977) suggested that the escort whale could have a protective function. However, Tyack and Whitehead (1983), proposed that the escorts are probably males waiting for the opportunity to mate if the female is receptive. This hypothesis is now accepted and it has been supported by other researchers (Baker and Herman, 1984a; Mobley and Herman, 1985). On the other hand, Clapham and Mayo (1987) determined the sex of 91 escorts out of 138 observed, and found that 55 (60.5%) were females and 36 (39.5%) males. This grouping pattern needs further interpretation and to that end determination of the sex of the individuals will probably be useful.

On September 6, 1986 a trio of a female and two males were observed in aggressive behaviour for nearly 15 minutes; one individual left and the other two showed excitement on the surface for more than 10 minutes; they even jumped with their bodies ventrally joined for several seconds. Because it was mostly underwater, the specific function of this activity was not clear.

Sixteen groups of more than 3 individuals were seen in the three years. The maximum number was nine. Most, showed agonistic behaviour (collisions, persecutions, excitement, loud noises, bubble expulsion and other aggressive activities) and constant coming together and splitting off of individuals.

Agonistic and union-disunion behaviour, like those described here, have been reported by investigators in other breeding sites (Herman and Antinoja, 1977; Tyack and Whitehead, 1983; Baker and Herman, 1984a, b; Mobley and Herman, 1985; Silber, 1986).

It seems that a familiar bond may exist among some individuals because they were seen together on more than one occasion in the same year and even in two different years. Unfortunately, it was not possible to determine sex and age.

Traditionally, it has been assumed that Humpback Whales formed stable associations: family groups or reproductive couples (Whitehead, 1983). However, recent investigations show that this is not completely true. In the Antilles and in Hawaii, where humpbacks reproduce in the winter, groups stay together for a short period of time, excluding those formed by a calf (up to 1 year old) and her mother (Whitehead, 1981; Tyack and Whitehead, 1983; Baker and Herman, 1984a; Mobley and Herman, 1985). Further observations are needed to confirm whether the species forms stable family groups and whether it is monogamous or polygamous.

RECOMMENDATIONS

A major obstacle to understanding the social behaviour of humpbacks has been the difficulty of determining the age and sex of the individuals. With long term studies, based on photo-identification and underwater observations to determine sex, the knowledge of this species can be expanded making management and protection policies optimal. Therefore, investigations in the area of the park must be continued.

With the objective of elucidating the migratory routes of the species in the Colombian Pacific, investigations in other areas north of Gorgona must be carried out (Negritos Island, Palma Island, Malaga Bay, Utria Inlet, Cupica Gulf).

It has been recommended to the governmental management institute (INDERENA), to strictly control access of ships, boats and tourism to the Island, to avoid a threat to the Humpback Whale population.

Some sites in the Colombian Pacific where Humpback Whales have been reported are proposed to be managed as whale sanctuaries to ensure preservation through better management of this species which is seriously threatened.

ACKNOWLEDGEMENTS

This paper forms part of my master thesis in marine biology at the Universidad Nacional de Colombia. This research would not have been possible without funds from World Wildlife Fund in 1986, from the Long Term Research Institute in 1987 and from Lylia González (my mother) in 1988. Especially, I want to thank Dr Roger Payne, to whom the initiation of this research is attributed; for his advice in the study of the humpbacks and his help in finding funds. I wish to thank the Instituto Nacional de los Recursos Naturales Renovables (INDERENA), The Museo del Mar of the Universidad Jorge Tadeo Lozano, the Instituto de Investigaciones Marinas de Punta de Betin (INVEMAR) and the Universidad Nacional, for their logistic support.

I thank Wilfredo Henao, Luis Fernando Constain, Gustavo Bravo, Thomas Lyrholm for their help in the field work. I give special thanks to Carlos Patiño, Kathleen O'Connell, Roberto Tovar, Elvira Alvarado, Walter Mankel, Sven Zea, Arturo Acero, Fernando Patiño and Orlando Rodriguez who constantly encouraged and supported my research. I want to express my gratitude to my family for their support in the realization of all my projects and to marine biologists Elvira Alvarado, Sven Zea and Adriana Beltrán, for translation and corrections of this manuscript.

REFERENCES

ALBERICO, M. 1986. Los Mamiferos. 191–210. In Prahl, H.V and Alberico, M., (eds), 'Isla de Gorgona'. (Biblioteca Banco Popular: Bogotá) 252p.

AGUAYO-LOBO, A. AND TORRES, D. 1967. Observaciones sobre mamiferos marinos durante la vigésima comisión Antárctica chilena. Rev. Biol.Mar. 13(1):1–58.

BAKER, C.S. AND HERMAN, L.M. 1984a. Aggressive behaviour between Humpback Whales (*Megaptera novaeangliae*) wintering in Hawaiian waters. Can.J.Zool. 62(10):1922–1937.

BAKER, C.S. AND HERMAN, L.M. 1984b. Seasonal contrast in the social behaviour of the Humpback Whale. Cetus 5(2): 14–16.

BAKER, C.S., PERRY, A. AND HERMAN, L.M. 1987. Reproductive histories of female humpback whales *Megaptera novaeangliae* in the north Pacific. Mar.Ecol.Prog.Ser. 41: 103–114.

BALCOMB, K.C. III AND NICHOLS, G. 1982. Humpback whale censuses in the West Indies. Rep. Int. Whal. Commn 32: 401–406.

BEGON, M. 1979. 'Investigating animal abundance: capture-recapture for biologists' (University Park Press: Baltimore.)

CÁRDENAS, J.C., OPORTO, J. AND STUTZIN, M. 1986. Problemas de manejo que afectan a las poblaciones de cetáceos en Chile. Proposiciones para una politica de conservación y manejo. Amb.y.Des. 2(3): 107–116.

CHU, K.C. AND NIEUKIRK, S. 1988. Dorsal fin scars as indicator of age, sex, and social status in Humpback Whales (*Megaptera novaeangliae*). Can.J.Zool. 66: 416–420.

CLAPHAM, P.J. AND MAYO, C.A. 1987. Reproduction and recruitment of individually identified Humpback Whales, *Megaptera novaeangliae* observed in Massachusetts Bay, 1979-1985. Can.J.Zool. 65(11): 2853–2863.

DARLING, J.D. AND McSWEENEY, D. 1985. Observations on the migrations of north Pacific Humpback Whales (*Megaptera novaeangliae*). Can.J.Zool. 63(2): 308–314.

GUERRA-CORREA, C., WAEREBEEK, K. van, PORTFLITT-KANDORA, G. AND LUNA-JORQUEVA, G. 1987. Presencia de cetáceos frente a la segunda región de Chile. Estud. Oceanol. 6: 87–96.

HERMAN, L.M. AND ANTINOJA, R.C. 1977. Humpback whales in the Hawaiian breeding water: Population and pods characteristics. Sci.Rep.Whales Res.Inst. 29: 59–85.

HERMAN, L.M., FORESTELL, P.H. AND ANTINOJA, R.C., 1979. The 1976/1977 migration of Humpback Whales into Hawaiian waters: composite description. Mar.Mam.Com.Rep. MMC-77/19. Washington, D.C. 55p.

INDERENA. 1986. Colombia. Parques Nacionales. 2a ed. FEN edits. Bogotà. 263p.

KATONA, S.K., BAXTER, B., BRAZIER, O., KRAUS, S., PERKINGS, J. AND WHITEHEAD, H. 1979. Identifications of Humpback Whales by fluke photographs. 33–44. In Winn, H.E. & Olla, B.L. (eds). 'Behaviour of marine animals - current perspectives in resarch. v.3. Cetaceans.' (Plenum Press, New York).

KAUFMAN, G.D. AND FORESTELL, P.H. 1986. 'Hawaii's Humpback Whales'. (Pacific Foundation Press: Maui), 176p.

KAUFMAN, G.D., SMULTEA, M.A. AND FORESTELL, P.A. 1987. Use of lateral body pigmentation patterns for photographic identification of east Australian (Area V) humpback whales. Cetus 7(1): 5–13.

LLINÁS, R.R., PINTO, J.N., PEÑA, F. AND CARO, F. 1990. Geologia. 55–64. In Aguirre, J. and Rangel, O. (eds), 'Biota y ecosistemas de Gorgona. (Fóndo PEN–Colombia, Editorial Presencia Ltda: Bogotá). 303p.

MAYO, C., CARLSON, C., CLAPHAM, P.J. AND MATTILA, D.K. 1985. 'Humpback whales of the southern Gulf of Maine'. (Center for Coastal Studies: Provincetown), 62p.

MOBLEY, J.R. Jr. AND HERMAN, L.M. 1985. Transcience of social affiliations among Humpback Whales (*Megaptera novaeangliae*) on the Hawaiian wintering grounds. Can.J.Zool. 63: 762–72.

PAIVA, M.P. AND GRANGEIRO, B.F. 1970. Investigations on the whaling seasons 1964–1967 off northeastern coast of Brazil. Arq. Cien. Mar 10(2): 111–126.

PINEDO, M.C. AND CASTELO, H.P. 1980. Estudos de cetáceos no oceano Atlântico sul occidental e a falta de uma política de conservacao e manejo no Brasil. Bolm Inst. Oceanogr., Sao Paulo 29(2): 319–21.

PITTMAN, S. AND DANTON, C. 1985. Humphack Whale behaviour. Apendix II. 48–53. In Mayo, C. et al.

SICILIANO, S., LODI, L, SALES, G. AND GONCHOROSKY, L. 1990. Observacoes de baleias jubarte *Megaptera novaeangliae*, no Banco dos Abrolhos, Costa Nordeste do Brasil. 40. In 4a Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur. 12–15 de Nov. 1990. (CIMMA-Universidad Austral de Chile: Valdivia), 75p.

SILBER, G. 1986. The relationship of social vocalizations to surface behaviour and aggression in the Hawaiian Humpback Whale (*Megaptera novaeangliae*). Can.J.Zool. 64(1): 2075–2080.

STONE, G.S. AND HAMNER, W.M. 1988. Humpback whales *Megaptera novaeangliae* and southern right whales *Eubalaena australis* in Gerlache Strait, Antarctica. Polar Record 24(148): 15–20.

STONE, G.S., FLOREZ-GONZALEZ, L. AND KATONA, S. 1990. Whale migration record. Nature 346: 705.

TYACK, P. AND WHITEHEAD, H. 1983. Male competition in large groups of wintering Humpback Whales. Behaviour 83: 132–154.

WHITEHEAD, H.P. 1981. The behaviour and ecology of the Humpback Whale in the northwest Atlantic. PhD thesis, Univ. Cambridge.(unpubl.).

WHITEHEAD, H.P. 1983. Structure and stability of Humpback Whale groups off Newfoundland. Can.J.Zool. 61(6): 1391–1401.

WHITEHEAD, H. 1985a. Why whales leap. Scientific American 251(3): 84–93.

WHITEHEAD, H. 1985b. Humpback whale breaching. 117–155. In Pilleri, G. (ed.), 'Investigations on Cetacea. vol. 17.